

REPORT # 11.

RELATION OF INSECT INFESTATION

TO

PHENOLOGICAL EVENTS

ON

LAMB'S MINE UNIT

ASHLAND, OREGON.

1916

By

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REPORT # 11.

RELATION OF INSECT INFESTATION TO PHENOLOGICAL EVENTS ON

LAMB'S MINE UNIT.

Difference in Development of Broods of D. brevicornis on North and South Sides of Trees.

Without considering the elevation, the records on the Lamb's Mine Unit show that for the overwintering generation of D. brevicornis there is a great difference in the development of the broods on the north and south sides of the same tree. This great difference does not occur in trees of the 1st or summer generation.

Table I. gives records from transferred slabs of bark.

Table I.

RECORDS ON TRANSFERRED BARK.

<u>No of days by which brood south side was earlier in Spring.</u>							
:	East	:	Last	First	Last	:	:
:First	:Pupae	:First	:Adult	:Emer-	:Emer-	:	:
:Pupae	:Formin	:Adult	:Formin	:gence	:gence	:	Remarks.
Bark placed on north and south side of station transferred Dec 5, 1914. Brood in larval state.	31	31	26	32			No emergence on south as beetles were killed by hot sun.
Slabs from Tree 54 Transferred Nov. 27, 1915. Brood in larval state.	21	32	35	24	30	15	

North and south development in overwintering generation trees.

Table II. shows that for the six events between first pupae and last emerging there is an average difference of 35.4 days between north and south sides of the record trees of the overwintering generation. Some of this difference may be due to a difference in age of broods, but trees that were known to represent different broods have been eliminated from the table.

There were no record trees of this generation in which the brood developed evenly on north and south sides.

Table II.

RECORD TREES OF OVERWINTERING GENERATION.

: No days by which brood in south side was earlier in the Spring. :						
: Last :		: Last :		: First : East :		:
Tree:	First : pupae :	First : adult :	Emerg-:	Emerg-:	:	:
No.:	pupae : forming:	adult : forming:	ing. :	ing. :	Remarks.	
6	16	35	24	36	13	14
97	18	—	34			31
56	39		32	32	35	16
69	30	31	32	34	43	42
67	46	34	59	56	56	21
69	53	31	59	49	55	31
86	53	52	24	30	48	30
94	41	57	70	65	15	30
57	30	42	43	42	49	30
64	39	25	50	42	42	27
92	42	34	15	31	15	30
60	32	65	56	42	30	
75	34	42	42	42	15	26
68	24		31	45	31	
66	24	11	28	35	31	35
Average	34.7	35.5	39.9	41.5	34.2	27.1
Gen. Average						35.4

North and South Development in First Generation Trees.

The broods in the first generation trees develop almost uniformly on the north and south sides of the trees. In fact in a few trees the broods developed first on the north side. (Trees 83 and 661).

Table III.

RECORD TREES OF 1916—1st. GENERATION.

: No. days by which brood on south side was earlier. :							
: Last :		: Last :		: Last :		: First : Last :	
Tree:	First : larvae :	First : pupae :	First : adult :	emerg-:	emerg-:	:	:
No.:	larvae : forming:	pupae : forming:	adult : forming:	ence :	ence :		
83	7	5	0				
117	28	7	14	20	28	6	22
661			6	- 6	--	--	- 16
1969	10	21	8	22	--	0	0
511							
Average	11.3	7	4.2	7.7	4.7	9.3	2

- means earlier on North

Emergence records from the bark also indicate this same uniform development in 1st. generation trees.

Table IV.

EMERGENCE FROM BARK ON TREE # 311.

: Squares 9, 34 sq. ft. each marked off on four sides of tree.									
: S.W.		: S.E.		: N.E.		: N.W.			
Dates.	: square:	: square	: square.	: square.	: square.	: square.	: square.		
Aug. 31, 1916.	50 exit holes	50 exit holes	45 exit holes	81 exit holes					
Sept 11, 1916.	19 " "	22 " "	60 " "	34 " "					
Sept 16, 1916.	144 " "	100 " "	104 " "	100 " "					
Sept 23, 1916.	24 " "	25 " "	42 " "	27 " "					
Sept. 28, 1916.	8 " "	8 " "	7 " "	6 " "					
Sept 30, 1916.	2 " "	1 " "	1 " "	1 " "					
Oct. 7, 1916.	1 " "	0 " "	2 " "	5 " "					
Oct. 16, 1916.	2 " "	3 " "	0 " "	6 " "					
Oct. 21, 1916.	1 " "	0 " "	2 " "	2 " "					
Total	251	209	263	262	:	985			

This development is also shown from records of attack and emergence from squares marked off on tree 661.

Table V.

ATTACK AND EMERGENCE FROM SQUARES MARKED OFF ON TREE 661.

114 square inches per slab.

Attacks.									
Date.	S.	S.E.	E.	N.E.	N.	N.W.	W.	S.W.	Total
June 10	2	5	4	2	2	4	1	1	21
June 17	1		2		1				4
June 24	1				1				2
July 2		1			1				2
Total	4	6	6	2	5	4	1	1	29
Emergence									
Aug. 11	1	10	8	3		2	15	2	41
Aug. 29	1	4	8	6	7	7	14	5	52
Aug. 26		2	1		2	3	4	14	26
Sept 2		1	1				2	6	10
Sept 11			1				2		4
Total	2	17	19	9	9	13	37	27	133

Transferring Bark.

As a check experiment to determine if the removing of slabs of bark from the tree, as was done on the Mistletoe and Lamb's Mine phenological routes, had any direct effect on the developing brood, bark was taken

from the north side of tree # 60, elevation 4100 feet, and placed on the north side of ~~tree~~ an adjacent tree.

Table VI.

Bark Transferred from North side of Tree # 60 to near by tree.

No. of days by which Transferred bark was earlier.					
First pupae	Last pupae forming	First adult	Last adult forming	First emergence	Last emergence
0	15	0	5	0	0

Thus there was practically no difference between the transferred bark and that on the infested tree.

Difference between North and South Slope Exposure.

Bark taken from tree # 2, Dec. 5, 1914 and placed on the north side of trees, on north and south slopes at phenological station #13, Elevation 3600 feet, showed some difference in development due to slope exposure.

Table VII.

Difference between North and South slope exposures.

Bark on North side of trees, elevation 3600' Transferred
Dec. 5, 1914.

No. of days by which brood in south slope was earlier.					
First pupae	Last pupae forming	First adult	Last adult forming	First emergence	Last emergence
9	10	20	7	7	7

In general, it has been noticed that on the Lamb's Mine Unit south-west exposures are the earliest and northeast the latest. This holds true for both plant and insect activities. (The effect on plant activities was summarized in a memorandum of July 24, 1915.).

Difference due to elevation.

The range of elevation on the Lamb's Mine Unit, in which the infestation is found, is small, ranging from 2000 feet to 4100 feet.

The following table lists the records of trees according to elevation slope and exposure. There is in general a lengthening of the activity

periods at the higher elevations, but the normal inconsistencies, and many other disturbing factors which enter into the records, tend to obscure the effect of altitude.

Table VIII.

RECORD TREE EVENT PERIODS AT DIFFERENT ELEVATIONS.

1915-2nd. Generation.

Elev- ation	Expos-	Attack	Event Periods				Brood	Page No.		
			Per. to	Tree	In Report					
			Event	Per.	Larvae	Pupa	Adult	First Em.	No.	# 2.
2850	W			25	30	225	118	31		
2850	W			21	25	216	119	30		
2950	W			13	30	213	75	31		
2950	W		122	30	16	216	57	30		
2950	W			20	9	191	56	28		
3000	W		122	30	16	216	64	30		
3000	W		122	22	18	200	63	32		
3050	NW			51	8	259	70	33		
3200	E			11	31	212	92	31		
3200	E			25	24	222	94	29		
3200	SE			22	18	213	60	29		
3250	W			22	17	212	67	29		
3250	W			22	16	211	68	29		
3250	S			13	17	208	50	28		
3300	NW			51	24	240	65	32		
3300	N		135	40	11	206	66	32		
3300	SE			27	15	212	59	32		
3350	E			43	18	231	72	31		
3350	E			24	18	212	73	31		
3600	NW			20	5	240	506	34		
3600	W			37	6	251	508	33		
3650	S			26	8	244	22M	33		
3650	S	8	136	64	19	5	232	2A	34	
3650	SW		148	29	17	212	52	30		
3650	SW		160	21	8	208	51	28		
3700	SW			29	28	228	54	30		
3750	SW			27	14	214	86	29		
3750	S		119	86	25	20	27	62	34	
4100	SW			20	43	233	60	31		
4100	SW			60	7	258	61	33		

1916-1st. Generation.

2500	NW				8	4		320	36
2800	N	37	35	42	14	7	135	117	35
2950	SW	7	35	37	12	7	98	83	34
2950	W	44	40	26	7	7	85	78	35
2950	W	44	37	43	16	6	146	79	35
3000	E	21				8	90	98	36
3000	W	14	7	35	7	6	69	661	36
3200	W		38	30	8	5	86	1026	35
3200	SE			27	14	7	99	1069	36
3400	SE					13		311	36

Relation of Yellow Pine Development to Insect Attack.

Diagram # 1 is a plot comparing the yellow pine activities on the Lamb's Mine route, as shown by the 1916 phonological records, with the attack of the three principle insects enemies of the yellow pine, during that year and for nearly the same range of elevations.

The plot of each plant activity covers the duration of that activity, between elevations 2000 and 3600 feet.

The period of each insect attack is also the period of attack between elevations 2500 and 4100 feet.

Generations:-

The generations referred to are not the insect generations but the generations from the tree standpoint as we recognize them in the field. The first generation ~~or the summer~~ generation, arbitrarily includes trees which are attacked in the spring and summer, the broods emerging almost entirely before winter. The second generation includes trees attacked in the fall and which carry broods over the winter.

D. brevicornis.

The first generation trees numbered 100 standing trees and 18 trap and fallen trees. The first attack was on the base of previously infested trees, and topkilled trees. Attack began on ^{a few} apparently healthy trees on April 15th and continued until the first of July. Maximum attack occurred about June 22nd. On the whole however, the attack for this first generation was on topkilled and weakened trees.

The second generation data is not complete, but the main attack is during September, and is almost uniformly on healthy standing trees.

D. monticolae.

The earlier emerging adults form a partial attack in the spring, but the main attack is after the ripening period of the trees in September.

Ips confusus.

The first generation of Ips confusus is almost uniformly on windfalls, logs and fallen trees. We have no records of spring attack on standing trees. The second generation attack occurs in September, and in 1915 it was altogether on standing trees, the tops of mature trees and small thrifty trees.

Respectfully submitted,

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Ashland Oregon,

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